



HEWLETT
PACKARD

4955A Protocol Analyzer



TECHNICAL DATA 1 NOV 82



DTE DCE ETC TC RC RTS CTS DSR DTR RI CD SQ DRS SRS SCS SCD
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HEWLETT - PACKARD

4955A

PROTOCOL ANALYZER

05/03 14:08:48

USE SOFTKEYS TO MAKE CHOICES

Setup
Menu

Monitor
Menu

Simulate
Menu

Display
Menu

Run
Menu

Examine
Data

Mass
Store

Basic

Softkeys—the intelligent choice.

The 4955A Protocol Analyzer is a powerful data communications tool. It can help you with the development, installation, troubleshooting, and performance optimization of your network.

Eight software defined keys (softkeys) are your interface to the extensive troubleshooting capability of the 4955A. Simulating network components or performing comprehensive data analysis is straightforward with the 4955A's user-friendly, softkey driven menus. Rather than typing obscure code words, entries are made with the touch of a softkey. Syntax errors are greatly reduced and measurements are rapidly created.

The Top Level menu (shown above) is the gateway through which the primary menus are entered. This display appears at power-on and may be returned to at any time with the touch of a key. Mnemonic

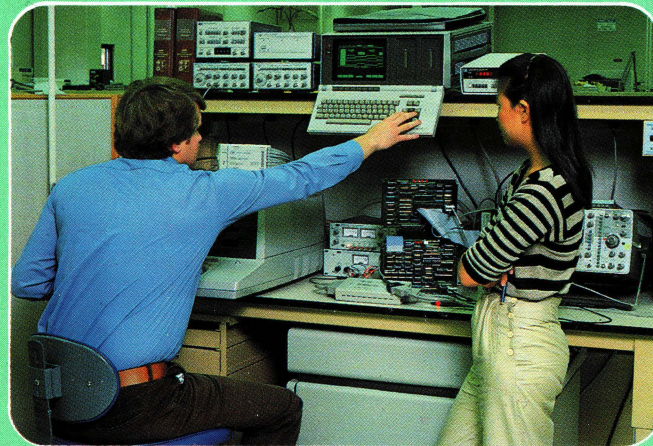
labeled "LEDs" (softleds) near the top of the display indicate activity on the line. They are an integral part of the run-time display also.

The menus provide testing capability at the Physical, Data Link (frame), and Network (packet) protocol levels. An optional BASIC Programming Language enables higher level protocol analysis, more extensive emulation, statistical measurements, and display control.

The three requirements of an intelligent data analyzer are: 1) high level analysis and simulation capability; 2) flexibility to handle a variety of system parameters (protocols, speeds, data codes, etc.); 3) ease of use for quick access to the instrument's capabilities. The 4955A, with its unique human interface, has made a significant contribution in each of these areas. It is an ideal tool for R&D and network troubleshooting.

In the lab, EDP center, or the field, HP provides a comprehensive solution to your most intricate datacom problems.

Research and Development



Design of communications equipment (terminals, modems, serial I/O cards, multiplexers) requires a development tool with extensive interactive capabilities. The 4955A Protocol Analyzer can shorten the development cycle by exercising communications hardware and software through its Physical Interface Pods (RS-232C, RS-449, V.35, etc.). The datacom enhanced BASIC programming language enables sophisticated emulation and dedicated testing of proprietary protocols and architectures.

Data Communications Networks

- Development
- Installation
- Troubleshooting
- Performance

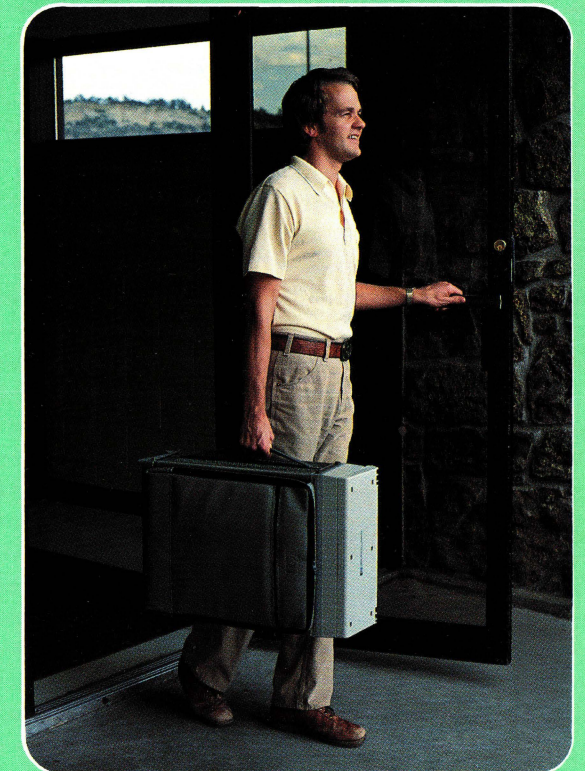


Network Analysis



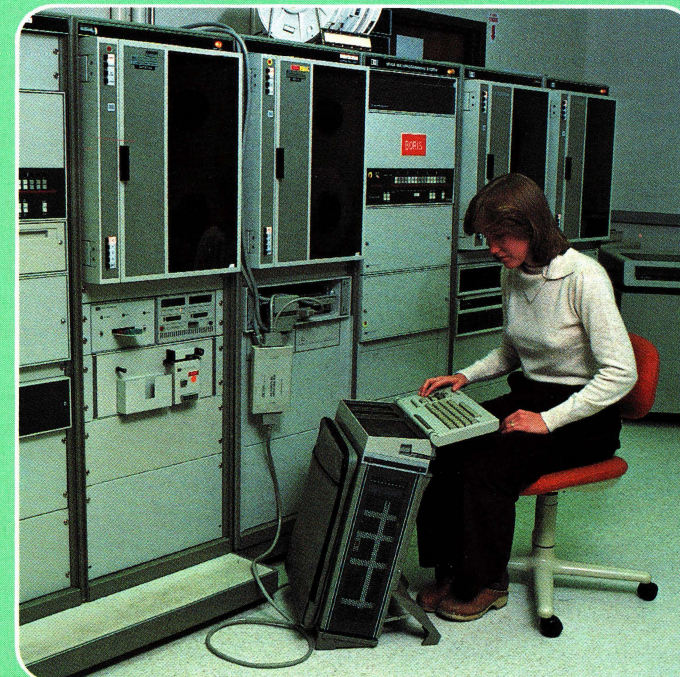
Network analysis can help data communications managers plan for future growth. Hard copy printout and data storage on tape provide long term records of network performance. This information can be used to make capital equipment buying decisions.

Field Service



The HP 4955A Protocol Analyzer is a self-contained solution to your datacom problems. It has an adjustable keyboard and fold-out cabinet legs for bench use, rack mounting, or even floor standing operation. The bright, high resolution display provides easy viewing. A removable pouch provides storage for the Physical Interface Pods, cables, power cord, and tape cartridges. The keyboard folds up to protect the instrument during transport. Routines may be stored on tape for later use in the field.

Network Troubleshooting

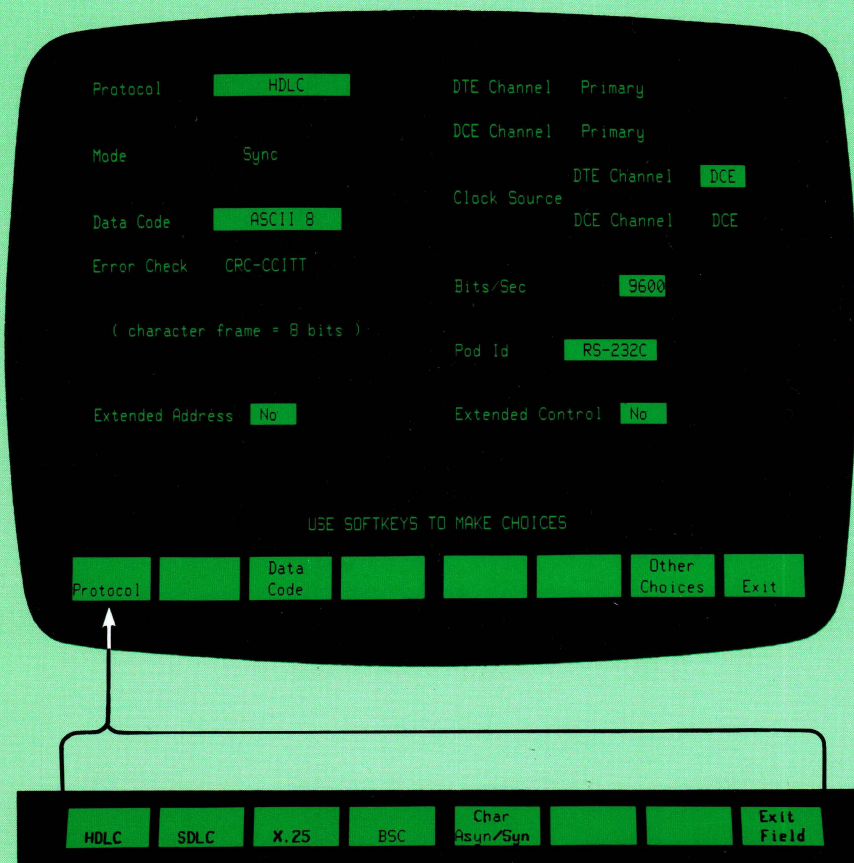


Increasing network availability is key to network control and EDP centers. Quick fault isolation is provided by the 4955A's versatile, easy to use, softkey guided menus. Statistical network analysis and graphical display of results is accomplished in the BASIC programming language.

Installation of new communications equipment often requires temporary disruption of the system. The 4955A can minimize downtime by thoroughly exercising equipment before it is installed.

UNIQUE FEATURES

- **Softkey Guided Menus:** Friendly, Intelligent, Systematic, Versatile.
- **BASIC Programming Language:** enhanced with datacom statements.
- **High Speed:** 50 bps to 72 kbps.
- **128K Word Buffer Memory:** stores data, complete timing information, and interface lead status for post-processing.
- **Dual Tape Drives:** for storing setups, measurements, programs, and data.
- **63 Triggers:** for extensive data analysis, real-time or in a post-processing mode.
- **Soffleds:** Lead status display is automatically configured to the attached Physical Interface Pod.
- **Printer Output:** Printout of any screen to a compatible thermal printer.
- **Remote control:** via an HP-IB (IEEE-488) controller.

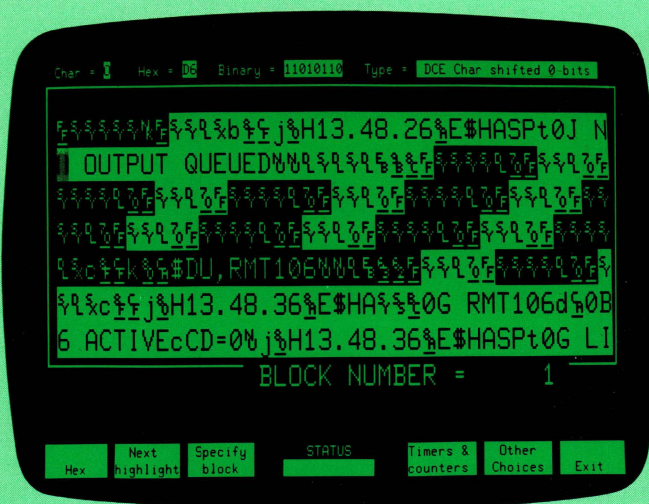


SETUP MENU: The Setup menu is reformatted for each protocol so that only the relevant parameters are presented.

The Setup menu demonstrates the versatility of the 4955A to be configured to most networks. The softkeys provide quick access to this flexibility. To change the Protocol selection for example, press the softkey labeled **Protocol**. The softkeys are immediately relabeled with the appropriate choices. Selecting one enters that choice in the Protocol field.

Seven data codes are supplied with the 4955A. The user may define any shifted or unshifted code using the supplied application program, and store it on tape for future use. The 4955A supports bit and character oriented protocols. Common data rates are softkey entered; other data rates may be entered directly from the keyboard. Custom character synchronous protocols, asynchronous transmission, secondary channels, and transparent text are also supported.

Capability, versatility, and ease of use . . .



INTERMIXED DTE and DCE DATA: Data is displayed in double size characters for easy viewing. The top line of the display gives detailed information about the character at the cursor's position.



DATA and STATE DISPLAY: The user may display the status of four interface control leads with the data. Activity on 15 control leads is stored in the buffer.

Data is displayed on the 4955A in seven display formats selected in the Display menu. The format may be changed during run-time with the touch of a softkey.

Captured data is inspected in the Examine Data menu. (BLOCK NUMBERS indicate location in the buffer of the displayed data.) The softkeys in the Examine Data menu allow:

- 1) **Hex**— data to be displayed in hexadecimal;
- 2) **Next highlight**— the display to be advanced to the next highlighted trigger event;
- 3) **Specify block**— any block of buffer data to be quickly located and displayed;
- 4) **Timers & counters**— the timer and counter values to be displayed;
- 5) **Load buffer, Store buffer**— data to be loaded from tape and stored to tape;
- 6) **Bit shift**— bit shifting of character synchronous data;
- 7) **Print buffer**— data to be output to a printer.



TWO-COLUMN FRAME DISPLAY: Level-2 frames are identified and decoded. The Highlight trigger feature is demonstrated in this display.



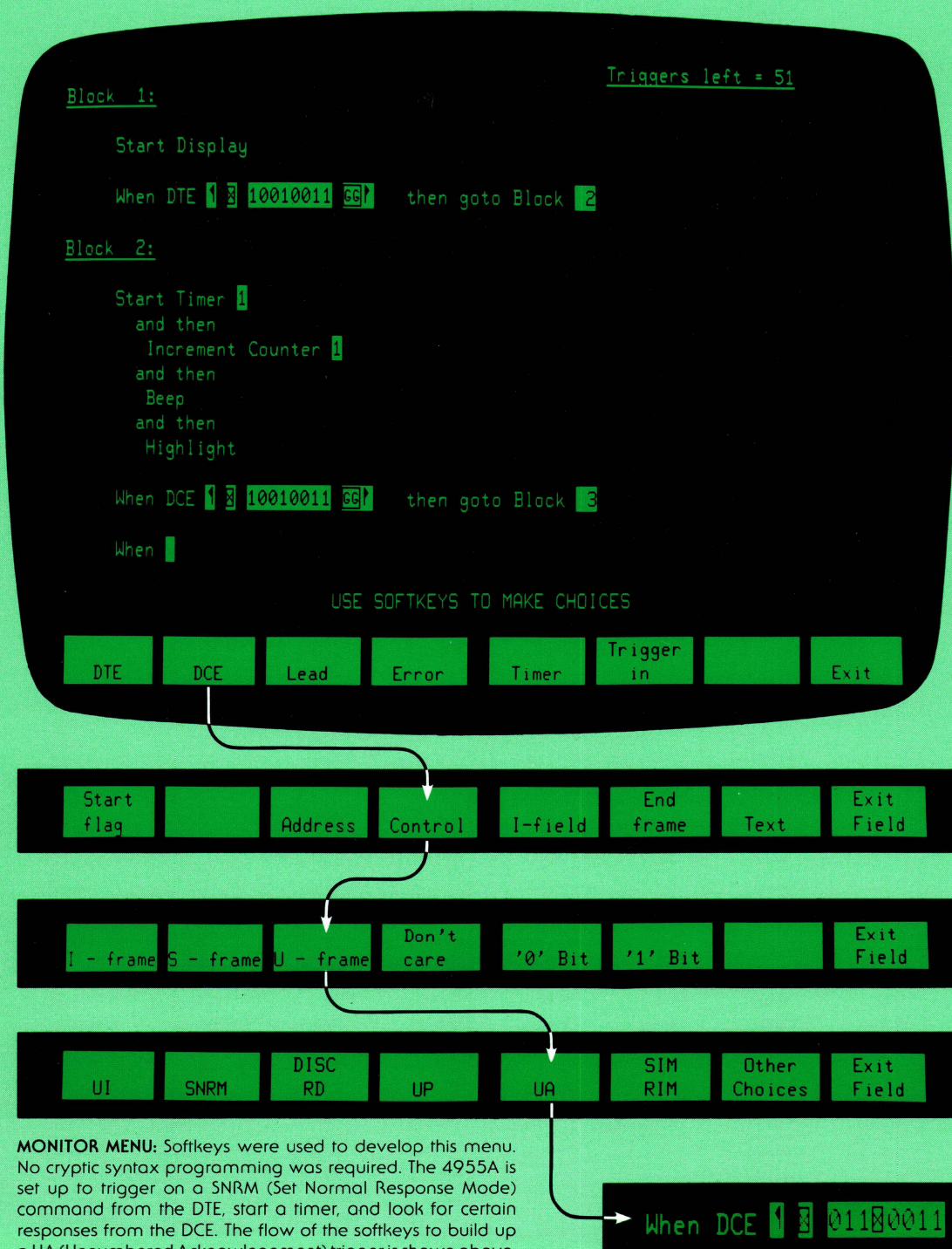
TWO-COLUMN PACKET DISPLAY: The X.25 packet header is decoded and the first five data field characters are shown.

through softkey guided measurements . . .

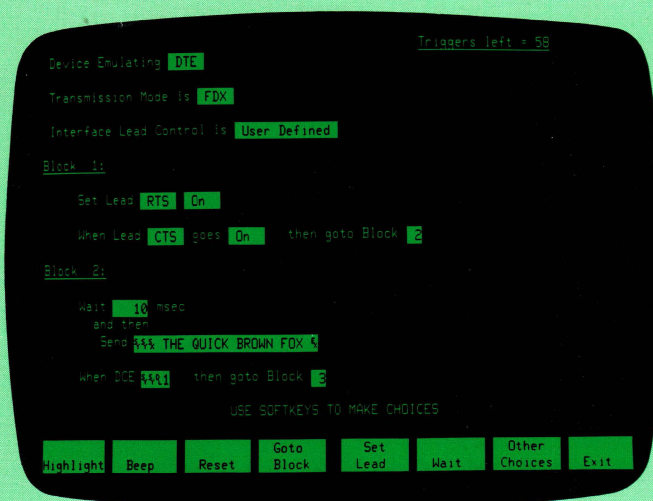
The full benefit of the softkey approach to troubleshooting is best realized in the Monitor and Simulate menus. Detailed measurements to isolate intermittent hardware and software problems can easily be set up and run.

The softkeys lead the user through the measurement by presenting the appropriate choices at each decision point in the menu. Keyboard typing and entry errors have been virtually eliminated. Bit oriented protocol control fields, such as those in the trigger strings shown below, may be softkey entered. Mnemonic labeled softkeys are supplied in both the Monitor and Simulate menus for all Level-2 (frame) and Level-3 (packet) fields. One need not memorize the various bit patterns or their respective positions.

The Monitor menu is used to analyze data on-line or data stored in the capture buffer. The source of the data is specified in the Run menu as is the run mode (**Monitor**, **Simulate**).



MONITOR MENU: Softkeys were used to develop this menu. No cryptic syntax programming was required. The 4955A is set up to trigger on a SNRM (Set Normal Response Mode) command from the DTE, start a timer, and look for certain responses from the DCE. The flow of the softkeys to build up a UA (Unnumbered Acknowledgement) trigger is shown above. Note that the number of remaining triggers is continually updated as the menu is entered.



SIMULATE MENU: This menu demonstrates User defined interface lead control in an interactive environment.

The Simulate menu uses the same commands and block structure as the Monitor menu. In addition, **Send** and **Set lead** softkeys are provided for interactive testing. The device to be emulated is specified (**DTE**, **DCE**) as is the transmission mode (**Half Duplex**, **Full Duplex**). The user may elect to define the status of the interface control leads or choose to let the 4955A control them automatically using standard handshake sequences and variable time delays. The stop-state conditions of the interface leads (**On**, **Off**, **Tri-state**) may be specified to keep the line up after the test is complete. Send strings may be entered from the keyboard or copied from buffer data. In bit oriented protocols, the user may elect to have the **N(R)**, **N(S)**, **P(R)**, **P(S)**, counts automatically incremented.

... and BASIC programming.



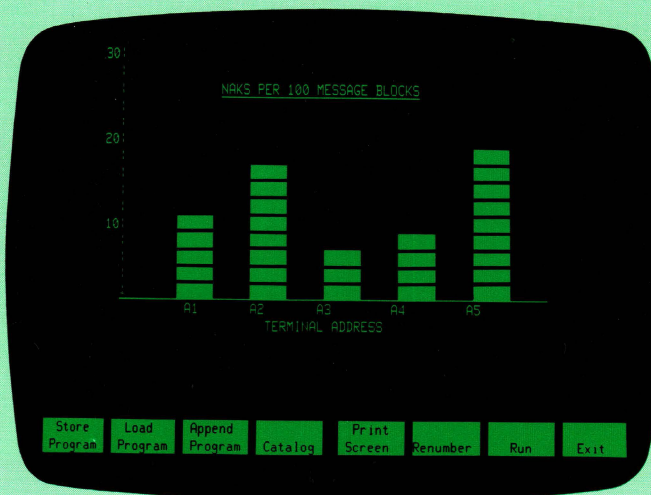
BASIC PROGRAMMING:

Sample program measuring RTS-CTS handshake timing.

The optional BASIC Programming Language provides capability beyond the Monitor and Simulate menus to:

- 1) create statistical displays (tables, graphs, histograms)
- 2) analyze higher level protocols
- 3) provide turn-key device emulation
- 4) create custom displays for unique protocols and architectures

Datacom extensions to BASIC, coupled with mnemonic softkey entry of triggers and **Send** strings, make programming in BASIC straightforward and powerful.



BASIC DISPLAY PAGE: Display control in BASIC enables graphical presentation of network performance.

GENERAL OPERATING CHARACTERISTICS

Protocols: X.25, HDLC, SDLC, BSC, and user definable character synchronous protocols.

Data Transfer Rates: 50 bps to 72 kbps using internal clock. 4955A can properly frame data at higher rates using an external clock.

Data Transmission Modes: Synchronous, Asynchronous, and Synchronous NRZI.

Capture Memory: 128K Words for storing data, timing, and interface lead status.

Character Framing: 5, 6, 7, or 8 information bits, plus parity.

Data Codes: ASCII, EBCDIC, Baudot, EBCD, IPARS, Selectric, and Transcode are provided. The user may quickly define other codes using the supplied application program, and store them to tape for future use.

Error Checking: CRC-CCITT, CRC-16, CRC-12, CRC-6, and LRC.

Parity: Odd, Even, None, and Ignore.

Triggers: 63—consisting of characters, errors, or interface lead transitions. External TTL pulse trigger-in and trigger-out ports are provided. Bit and character masking, and "not" characters are supported. Trigger events can be selectively displayed and stored to tape. Date and time are also stored for future reference.

Timers and Counters (5 of each):

Timers: 65535 msec, max.; 1 msec resolution and accuracy.

Counters: Up to 10 000.

Date and Time Clock: Battery backup.

Dual Tape Drives: Cartridges store data, timing information, menu configurations, custom data codes, application programs, and BASIC programs. The entire contents of the buffer memory may be stored on a single data cartridge.

BASIC Programming Language (Option 001); sample datacom extensions to BASIC:

START/STOP (TIMER, TAPE, DISPLAY)

SEND . . .

HIGHLIGHT . . .

DECODE FRAME/PACKET

SET LEAD . . .

DISPLAY . . .

EMULATE (DTE/DCE)

Display: A 23 cm (9 in.) diagonal, 25 line by 80 character display. Double size characters are selectable.

Keyboard: The full ASCII keyboard pivots and locks at any angle for convenient desk, bench, rack, or floor standing operation.

HP-IB (IEEE-488-1978):

a) Direct hard copy output of any display to an HP 2671G or 2673A printer.

b) Remote operation using an HP-IB controller.

HP-IB compatibility is: SH1, AH1, T2, L2, SR1, RL1, PP0, DC1, DT0, C1, C2, C4, C27, and E2.

Security: Inhibit simulation and data recording capability.

Self Test: Extensive self test and functional verification routines will isolate failures to the board assembly level. Built-in signature analysis permits fault isolation to the component level.





SPECIFICATIONS

Electromagnetic Compatibility: Type tested for compliance with VDE 0871 Level B, Radiated and Conducted.

Primary Channel Clock Accuracy: 0.005%.

Temperature: Operating 0°C to $+55^{\circ}\text{C}$ ($+32^{\circ}\text{F}$ to $+131^{\circ}\text{F}$)**
Storage -40°C to $+75^{\circ}\text{C}$ (-40°F to $+167^{\circ}\text{F}$)

**Tape drives should only be operated from $+5^{\circ}\text{C}$ to $+40^{\circ}\text{C}$ ($+41^{\circ}\text{F}$ to $+104^{\circ}\text{F}$).

Altitude: Operating 4600 m (15 000 ft)
Storage 15 300 m (50 000 ft)

Dimensions (overall, excluding pouch):

Length: 654 mm (25.7 in.)

Width: 436 mm (17.2 in.)

Height: 201 mm (7.9 in.)

Rack Height: 177 mm (6.97 in.)

Weight: Net 22 kg (49 lb)

Shipping 32 kg (70 lb)

Power Requirements: 110, 220 Vac, -15% to $+15\%$; 48 to 66 Hz single phase; 250 VA max.

HP-IB compatibility is: SH1, AH1, T2, L2, SR1, RL1, PPO, DC1, DT0, C1, C2, C4, C27, and E2.

ORDERING INFORMATION

USA LIST PRICES

4955A Protocol Analyzer (Includes 18135A) \$20,950.
Option 001: BASIC Programming Language add \$2,015.
Option 002: Deletes 18135A less \$1,100.
Option 908: Rack mount kit (5061-0078) add \$35.
Option 910: Additional Operating Manual add \$65.

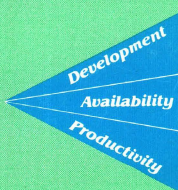
Physical Interface Pods:

18135A RS-232C/V.24 Interface Pod \$1,110.
18136A RS-449 Interface Pod \$1,110.
18137A V.35 Interface Pod \$1,110.
18139A MIL-188C Interface Pod \$1,110.

Other Accessories:

18140A Breakout Box (for all interfaces) \$505.
18141A Service Kit \$355.
18142A BASIC Programming Language, Field Retrofit Kit .. \$2,315.
98200A Certified blank tape cartridges (set of five) \$95.
Transit Case (9211-2662) \$570.
One Day 4955A Training (+24A) \$1,475.

HP Datacom Measurements—Key to Network



For more information, call your local HP Sales Office or nearest Regional Office: Eastern (301) 258-2000; Midwestern (312) 255-9800; Southern (404) 955-1500; Western (213) 877-1282; Canadian (416) 678-9430. Ask the operator for Instrument Sales. Or, Write: Hewlett-Packard, 1501 Page Mill Road, Palo Alto, CA 94304. In Europe: Hewlett-Packard S.A., 7, rue du Bois-du-Lan, P.O. Box CH-1217 Meyrin 2, Geneva, Switzerland. In Japan: Yokogawa-Hewlett Packard Ltd., 29-21, Takaido-Higashi 3-chrome, Suganami-ku, Tokyo, 168.

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Data subject to change.

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